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ABSTRACT

This paper presents and discusses two research initiatives in New Zealand elementary schools in terms of factors influencing the path of professional development and sustained attention to information literacy. The first study was a comparison of professional development processes and children's learning outcomes in four elementary schools. Surveys used to uncover perceptions of information literacy development were followed by on-site workshops for teachers of 7 to 11 year olds. This provided a snapshot of challenges that are a function of different school cultures and teachers with varying levels of information literacy understanding and commitment, as well as revealing much about children as information problem solvers. The second study involved all teaching staff at a single elementary school. Again, aspects of the teachers' information literacy were revealed alongside those of children. Observing the students' information problem solving experience was a key element in professional development. Reflection on teaching practice was heightened by use of action research as the teachers' major learning activity. Findings in the following areas are highlighted: (1) school information cultures--frameworks, policies, and library management; (2) teachers' understanding and expectations about information skills; (3) effects of expectations of children as information problem solvers; (4) connecting teachers' and children's thinking and expectations; (5) the teaching and learning interface; and (6) relationships among staff. (MES)

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Revealing thinking

Teachers working together on information literacy

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Collaboration between library and teaching staff on single projects often goes well, but does not always lead to sustained collaboration or independent teaching in support of information literacy. Where teachers' understanding of information problem solving processes is under-developed and library media support is not available, multiple approaches to professional development are essential if teachers and children are to be empowered as information problem solvers. This paper presents and discusses two research initiatives in elementary schools in terms of factors influencing the path of professional development and sustained attention to information literacy. One has information problem solving as the primary focus whereas the second centres on teachers as learners and information problem solvers in their own right.

Introduction

As we move into the 21st century children are engaging with ideas and information sources that were not dreamed of thirty years ago, yet in some elementary classrooms changes in information literacy practice are hardly noticeable. The teacher may use a variety of information sources, the children may be enthusiastic, but they may not necessarily be *thinking with* and *about* the information they handle, or the processes they are in engaged in, in ways that empower them as future information problem solvers. While it is important to promote examples of excellent information literacy programmes, we need also to consider how to establish and maintain positive change in schools that are "stuck", where the spark of information literacy excellence has yet to be kindled.

Teachers' perceptions of information literacy and how it arises are critical factors in support for information skill development in the classroom. The question is how, in the face of competing educational pressures do we help the more reluctant teachers to explicitly support information literacy? From the outside, it can look like yet another curriculum add-on.

Focusing on information literacy in off-site courses provides one set of answers. Working collegially with school library media specialists provides another. A third option is for staff to participate in longer term distance learning, but none of these options deal with the wider issues of establishing and maintaining a different approach to teaching in the face of institutional pressures or collegial inertia. Research on school improvement outlines critical factors and sheds some light on the problem.

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For example, Hopkins, Ainscow and West (1994) have found that school improvement initiatives will be more effective where they focus directly on, and provide professional development specific to, a school's needs. Those needs depend on the conditions prevailing in the school: the characteristics of the children, teaching styles and available resources, together with relationships among staff and the community. In particular Hopkins (1996) discusses relationships between *frameworks* (policies, management structures etc), *roles and responsibilities* and *ways of working*. He points out that, "When teachers are faced with acquiring new teaching skills or mastering new curriculum material; the school is often faced with new ways of working that are incompatible with existing organisational structures." It follows that failure to acknowledge these issues is likely to undermine the effectiveness of the best workshops or courses and efforts of school library media specialists.

The factors outlined by Hopkins et al. were examined to varying extents within the two research projects to be discussed here. Both had professional development in information literacy as a central concern in situations where library media support was missing. In both, the gains for staff and children were significant but the need for further attention to the wider context of information literacy programmes is evident.

The catalyst for the first study was a suspicion that learning activities in some elementary schools did not reflect the fact that "information skills" had been a central feature of the New Zealand National Curriculum since 1993. Previous research had shown that the cognitive and metacognitive demands of information problem solving are often hidden from teachers (Moore, 1995). It was therefore likely that some would not be supporting information skill development effectively, but there was little information available about the nature of their needs for targeted professional development.

A comparison of professional development processes and children's learning outcomes in four elementary schools followed. Surveys used to uncover perceptions of information literacy development were followed by on-site workshops for teachers of 7 to 11 year olds (Moore, 1998). This provided a snapshot of challenges that are a function of different school cultures and teachers with varying levels of information literacy understanding and commitment, as well as revealing much about children as information problem solvers.

A further study involving *all* teaching staff at a fifth school was prompted by the findings (Island Bay School & Moore, 1999). Again, aspects of the teachers' information literacy were revealed alongside those of children. Observing the students' experience of information problem solving was a key element in professional development. Reflection on teaching practice was heightened by use of action research as the teachers' major learning activity.

Research Questions

The extensive research questions for the two studies overlapped to some degree. Those of greatest interest here concerned description of :

- perceptions of information literacy among elementary school teachers,
- teachers' expectations of and children's experiences as information problem solvers,

- levels of support needed by children and teachers as information problem solvers, and
- ways of collaborating to make information literacy goals part of all learning activities.

An overall aim was to refine methods of professional development to promote continued integration of information skills across the curriculum beyond the life of the research.

Methodology

The first project involved four parallel case studies in suburban elementary schools over a period of a school year. Triangulation across six methods of data collection was expected to increase reliability and validity of research findings. Sources of information were as follows:

- survey of school documentation for evidence that information skills were explicitly addressed at policy level,
- interviews with principals, teachers with library responsibility and school administrators,
- survey of all teaching staff (N=40) covering understanding and expectations concerning information skills, resource-based learning and the role of the library and technology,
- participant observation of a series of four workshops held in each school for teachers (N=16) of children in years 3-6 (age range 7 to 11 years),
- four sets of classroom observations of children working on information problems, and
- teachers' observational notes and records of activity development.

Professional development centred on four workshops conducted in each school which were tailored to teachers' expressed needs, but which had a formal progression through the information problem solving process as a common framework. Staff developed classroom activities and children's information problem solving attempts were observed between workshops. Discussion of observations by teachers and the author supplemented professional development. Newsletters were used to promote some exchange of ideas between schools.

The second study centred on intensive professional development for *all* staff at a single elementary school over a period of four months. Workshops examining several models of information problem solving were used to focus attention on the demands placed on adults and children at various stages of that process. The main professional development activity, however, was action research on issues identified by teachers concerning problem solving and learning outcomes in their own classrooms. Thus while the first project centred on the information problem solving process, the second more actively focused on factors Halsall (1998) prioritised in guidelines for effective professional development:

- *"A collaborative approach to diagnosing needs and to designing, implementing and evaluating teacher developmental activities*
- *using teachers' own experiences as the chief starting point for learning activities*

- *encouraging and enabling staff to define their own learning objectives*
- *developing skills of critical, reflective thinking about classroom practice, school level issues and factors, and about the process of change*
- *integrating learning with action: the adoption of a problem posing and problem solving perspective." (p.3)*

In addition, there was an emphasis throughout both studies on more knowledgeable people taking responsibility for parts of information problem solving that were challenging for learners. Vygotskian notions of "scaffolding" learning were simultaneously applied to teachers and children (Vygotsky, 1978). Again, this was made more explicit in the second study. In this case, the author was on-site for four months, providing workshops on information literacy as needed as well as practical research and teaching support. Again, teachers were continually encouraged to reflect on challenges they faced and the implications for supporting children completing resource based learning activities.

Data collection for teachers' individual projects involved surveys, direct observation and documentary analysis. Information sources of particular interest here are related only to the author's overall evaluation of the professional development initiative. They included staff planning documents, project development records, field notes from individual research discussions and workshops, teachers' written research reports and two evaluation surveys. The documentary data collection points listed allowed comparison of pre- and post-project plans and curriculum development in terms of information literacy content. The Principal was also interviewed to capture impressions of the profile of information literacy in the school at the beginning of the project. Although this evaluation could not be impartial, agreement across the variety of sources of data was expected to increase confidence in drawing conclusions about the effects of the project.

Both of these studies took place in New Zealand elementary schools where qualified information professionals were not available to support information technology and school library services. Instead, in all five schools, a teacher with a full class load took responsibility for the development of these resources and leadership in integrating their use across the curriculum.

Results/Findings

School Information Cultures: frameworks, policies and library management

Although information skills should be taught across the curriculum at all levels, there was no evidence of their consistent integration into policies of the four schools first studied. At best they appeared in one curriculum policy (usually English or Social Studies), thus the *frameworks* Hopkins (1996) identified as a factor in successful school improvement were weak with respect to information literacy. Further, in the only school with a strong emphasis on library development and use, there was a gap between policy and practice since teachers did not share the Principal's vision or integrate library use into teaching as mandated.

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Indeed, the management structures in all four schools were weak in that access to information via the library was limited to a fixed schedule and qualified library staff were not available. Moreover, staff with library responsibility had no regular teaching release time for their library duties, and use of information technology in classrooms was uneven and in its infancy. Finally, all principals and teachers with library responsibility thought that teachers' information skills needed improvement.

The school at the centre of the second study was comparable in the profile it accorded to information literacy. The principal considered that before the initiative, information skills were being addressed but with little specific attention or awareness on the part of the teachers. There was an expectation that given the chance, the skills would simply emerge – a view agreed by half the respondents surveyed in the first study. Moreover, when the 14 staff were asked about the most important purposes of the library, the most common response was "providing resources". Only one response made a possible reference to potential for information skills development, *"space to use their skills"*. Perhaps the clearest indication that the library was relegated to the periphery of teaching and learning was that none of the action research projects designed by teachers looked at library use at all! Despite this, the initial survey of teachers in this school indicated that children in ten classes were expected to use the school library for topic work. (Again, this is similar to the situation in the four other schools.)

Not only were policy and management structures not supportive of information literacy in the five schools studied, but survey responses in the first four suggested that teachers held confused ideas about information literacy and its development.

Teachers' understanding and expectations about information skills

As discussed elsewhere (Moore 1998), only half of the teachers surveyed in the first study could describe any way to break information processes into manageable units for teaching. Those who could list components of any model at all focused mostly on defining a problem and locating resources. Actually evaluating, analysing, organising or otherwise operating on the information found did not feature in their responses to open-ended questions.

In the second study, as teachers worked through the information process for their own research, it was noticeable that needs for scaffolding of learning were greatest when defining the core information problem in *concrete, observable* terms and analysing and interpreting the data collected. Organising and presenting information in research reports was also very challenging for at least half the staff. (Publication demands and deadlines did contribute to that however, as did the fact that most staff had not done formal research before.)

One cannot generalize from case study material, but one wonders whether teachers' lack of ability and confidence during these phases of adult information problem solving are an echo of the fact that those responding to the survey did not refer to evaluating or interpreting information when describing the overall process. If so, it is little surprise that children were expected to develop these skills without explicit teaching. Certainly, as they worked through the action research process, as a group, the teachers in the fifth school provided a graphic illustration of the affective changes described by Kuhlthau (1987) as being associated with

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phases of information problem solving. In general, it appeared that even for the more recently qualified teachers, information skills had not been included effectively in training.

Effects of expectations of and about children as information problem solvers

Expectations about the children's abilities and information skills appear to have had a strong influence in the first study, not only on the learning activities designed for children and observed in class, but also on the participants' responses to professional development activities. For example, the four-school comparison showed variations in the extent to which the staff expected children to be knowledgeable, motivated, thinkers. Where expectations were high, workshop events were continually and spontaneously related to classroom experiences. Teachers already modelled reflective thinking in the classroom and extended this easily to discussion of information problem solving. Where expectations of children were low, staff seemed reluctant to apply workshop activities to classroom learning, clearly stating that this approach was too academic for their students. In class, they rarely praised children as thinkers, but expected children to distinguish independently between cognitive and social purposes of group-work as well as inferring demands of information tasks.

The school in the second study fell somewhere between these two extremes with children not rewarded frequently for thinking and only a few teachers modelling thinking and problem solving. Teachers did however frequently refer to children as a *"bright bunch and highly able"*. Tackling tasks from an information problem solving perspective was therefore not seen as beyond reach. This may of course be a function of the fact that teachers were engaged in the projects on different levels. In the first study they participated in workshops and created activities at least partly for the benefit of the researchers, whereas in the second, learning activities for children served teachers' curriculum, information skills and research goals.

So what did teachers expect 7 to 11 year olds to be able to do as information problem solvers? The majority of the 40 teachers in the first study recognised that every aspect of resource based learning sometimes presented difficulties for children. Despite this, they generally expected children to have a clear idea of what they were seeking and to complete activities at home where the consistency of support and access to resources was highly variable. Although at the beginning of the study it was difficult to assess the information skills support provided in class, only in one school was there a strong possibility that children would be expected to complete project work quite independently.

In terms of assessing resource-based learning products, across the schools teachers were fairly uniform in the emphasis given to drawing conclusions, asking questions and searching, integrating, examining and organising information. In general, as one might expect for 7 to 11 year olds, they gave most attention to asking questions and searching. However, there were large differences between schools concerning emphasis always or often placed on assessing fact finding and evaluating and deliberating on information. It is interesting that in three schools, there was more frequent emphasis on drawing conclusions than there was on evaluating and deliberating on information found.

The second study shed further light on teachers' understanding of the thinking involved in information problem solving. In the context of analysing planned curriculum activities for

individual research projects, it was found that working one to one, staff could recognise, but not independently identify underlying information skills, even though we had been talking about the information problem solving process for a couple of weeks. This prompted a further workshop in which various models of the process were re-examined and pairs of staff analysed old work plans. The feed back was that this was a difficult task. There was also surprise that teachers had been expecting children to engage in so many aspects of information problem solving.

By the end of both studies, teachers reached similar conclusions about the need to explicitly teach information skills and to support the information problem solving process through questioning and modelling. They were also more aware of the need to evaluate resources thoroughly themselves and to help children build strategies for interacting with media rather than providing simple rules.

Information skills focus expected	One	Two	Three	Four
Fact finding	56%	55%	67%	36%
Asking questions and searching	78%	73%	89%	82%
Examining and organising	67%	46%	67%	64%
Evaluating and deliberating	**89%**	**46%**	**33%**	**55%**
Integrating information from two or more sources	33%	36%	44%	55%
Drawing conclusions	**67%**	**64%**	**56%**	**64%**
Conceptualizing	67%	64%	44%	55%

Table 1. Percentage of teachers in each school always or often focusing assessment on particular levels of thoughtful research (after Stripling and Pitts, 1988).

Connecting teachers' and children's thinking and expectations

In both studies, participation in workshop activities that provided information literacy challenges for adults similar to those experienced by their students acted as a reality check and encouraged adoption of the student's perspective. Recognition of the role of prior subject and information systems knowledge was a major issue here. It is apparently very difficult for educators to set aside their own knowledge in creating assignments and evaluating resources. The key was changing the focus from teaching to learning and attending to information skills application rather than subject matter alone. The link could then be made to children's performance and the teacher's responsibility to support learning.

Reading research literature was not enough to gain commitment to adopting an information literacy approach to teaching. Teachers needed to experience changes in children's learning for themselves! In the final evaluation, all workshop participants in the four school study commented on the value of systematic classroom observations and discussion in revealing children's information skills.

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This effect was greater in the second study where teachers had themselves defined the research focus and carried out some of the data collection. Here teachers had greater purpose for information gathering – they were required to analyse findings and decide not only which issues they would then address, but what they would look for as evidence of future improvement. Mostly, findings confirmed previous research, but some broke new ground. Seeing the practical benefits of their own research was crucial to creating a robust form of professional development.

In the single school case study, there was also a greater effect on teaching in areas of the curriculum outside topic work or resource-based learning. For example, a new entrant teacher found her 5 year olds capable of thinking about information critically and asking appropriate questions to extend knowledge. This started in shared news, but quickly and naturally flowed into reading and maths activities. Another used surveys in her research to examine children's perspectives on cd rom use. This was the stimulus for children collecting and interpreting data from a survey they designed themselves, thus integrating adult and child led research with social studies and mathematics.

The teaching and learning interface

An earlier study had suggested that information problem solving would be an ideal vehicle for explicitly supporting the development of critical and reflective thinking (Moore, 1995). Both of the studies discussed here were predicated upon assumptions about learners taking responsibility for managing their own learning and the provision of appropriate support for the development of metacognition as an essential element of information problem solving.

However, comparison of the path of professional development in four typical elementary schools showed that each school faced different challenges in creating supportive learning environments. Not only did staff differ in willingness to reflect on practice, but the characteristics of the children demanded different responses. For example, in one school children often found that materials to support the curriculum related only poorly to their own experience and language difficulties meant that some would have to read the same paragraph many times to gain basic understanding. Consequently, teachers had to put more energy into building bridges between school and home experiences to activate prior knowledge. Some children seemed to need expressed permission to apply their existing knowledge and information skills needed breaking into smaller steps to be achievable. The result was that teachers felt challenged in covering the requisite number of topics in the curriculum. Connecting ideas and fields of knowledge through information problem solving was not a prime consideration. This contrasted strongly with other schools where children's experience was automatically applied to learning and staff could draw on that, making connections between fragments of information automatic to every discussion. Teachers in this case provided very different models of knowledge organisation and information problem solving.

These types of relationships are illustrated in Figure 1, which shows the interface between the child as a reflective learner, constraints surrounding the teacher, and the wider context of the school in relation to information literacy. The diamond on the right illustrates sets of variables contributing to students' understanding and self-management of learning situations (with information problem solving mediating between learning and assessment), while

factors that educators co-ordinate in creating a supportive learning environment are on the left. The teacher's personal knowledge of the complexity of information problem solving and expectations for students' ability, influence learning activity and assessment design. They also influence the type of support offered to learners, but school-wide frameworks and the extent to which teaching staff work together constrain implementation.

Relationships among staff

In the four-school comparison, differences in group dynamics influenced the extent of information exchange and the way workshop activities were transferred to the classroom.

While all staff worked on the same aspect of information problem solving at the same time, even working in an open plan setting did not necessarily lead to collaboration on curriculum design. In addition, there was no apparent spread of professional development effects to other staff during the life of the project.

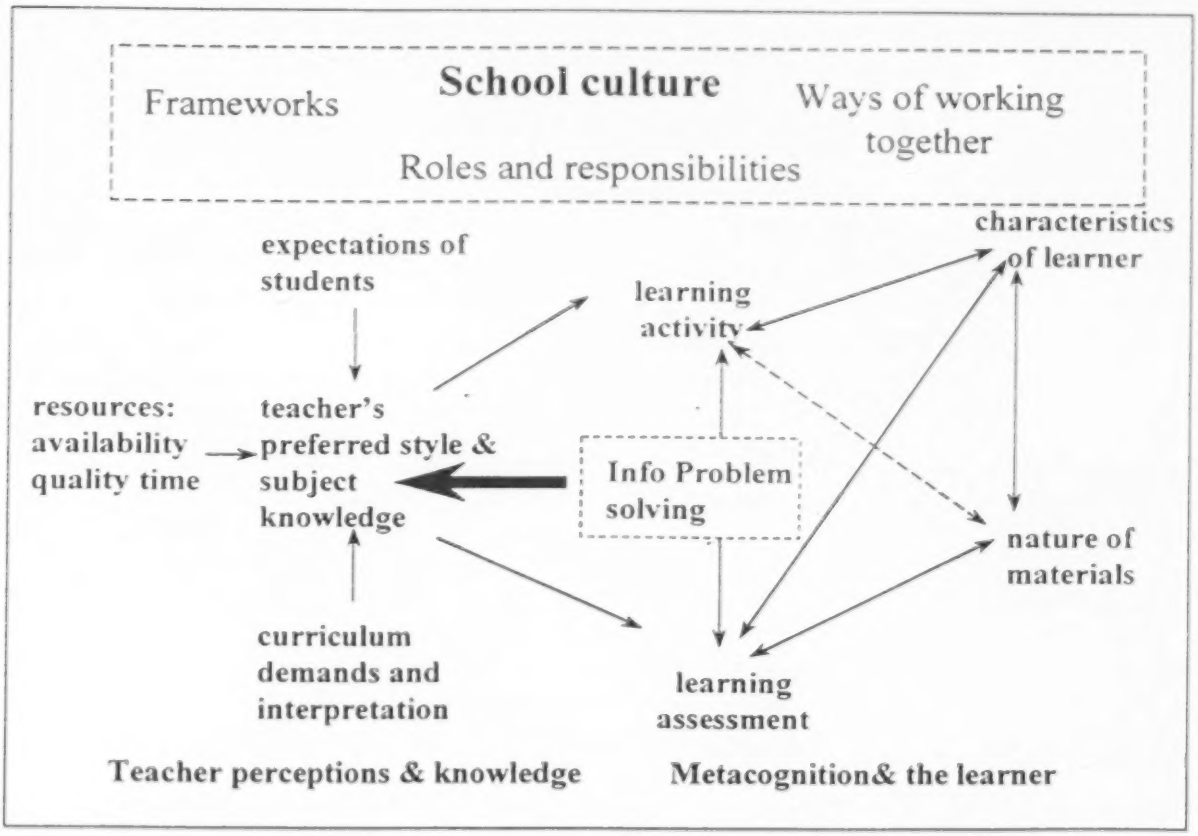

Figure 1. Interface between the child as a reflective learner, teacher's perceptions and knowledge and the wider context of the school in relation to information problem solving

In the single school case study, the intention had been to work on a small number of projects with several teachers addressing the same issues under the guidance of a group of teachers

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acting as project co-ordinators. However, even those team teaching in open-plan settings chose to work on individual projects. The co-ordinators group met to keep an overview of the twelve staff projects and to gain an appreciation of research management, but while one co-ordinator called on another for research assistance, teachers did not. (One reason for this was that the school had not worked through a way of releasing staff from teaching so that co-ordinators could be available in school hours.)

Teachers did however meet with others examining similar information literacy topics and found themselves working outside usual curriculum and syndicate groupings. These appear to have prepared the ground for closer collaboration and knowledge sharing in the future. For example, plans were developed for each teacher to lead a professional development discussion based on their own research project. In addition, at least two teachers intended applying colleagues' insights and teaching methods to their own classes and to evaluate effects on children's learning. This is in contrast to the first study where information literacy practices had changed and were to be maintained in all schools, but participants did not spontaneously signal systematic evaluation or professional development for their colleagues.

Conclusions

The schools discussed above were highly similar in the profile initially accorded to information literacy. In all cases, individual teachers' classroom practice changed as a result of the initiatives, but wider support for library media programmes has yet to emerge. Indeed, only in one school did observations of children focus on a library activity of any kind. Given the level of available on-site support it is not surprising that school libraries were not seen as central to teaching and learning. Creating excellent school library media programmes is difficult in this context and alternative strategies are needed to promote information literacy and empower teachers as well as children.

Attention to the frameworks suggested by Hopkins (1996) will help staff co-ordinate library, information technology and curriculum developments. However, the nature of the community of learners and the resources available had a profound influence on the level of support teachers needed for promoting information literacy.

Professional development centred on workshops about teaching information skills followed by classroom observations was sufficient to effect change in schools where staff were already reflective practitioners with high expectations of children as thinkers. These teachers simply needed a catalyst for making external knowledge their own. In contrast, in schools where teachers were struggling to ensure children met basic curriculum objectives, there was less energy for reflection and support was needed for recognising the educational potential and practicality of information skills. The key to changing staff perceptions was observing changes in children's learning outcomes for themselves.

In the single school study, the focus was not on *teaching* about information problem solving, rather it was on supporting teachers as *learners*. Their experiences of research were continually discussed in terms of information problem solving and implications for supporting children in similar tasks. In this context professional development moved from being a peripheral activity, to being part of the central life of the school. This is perhaps a more robust model for development in schools where information literacy has not been an

accepted goal. In addition, such developments are not as vulnerable to collapse if teaching staff leave, particularly if school frameworks formally include attention to information literacy.

To make the most of the intellectual capital now invested in that school, future information literacy initiatives need to be centred on tasks that cannot be completed without input from everyone. Each teacher has skills and experience others lack. One such task is the development of information technology and library development plans that have to begin, not with discussion of physical surroundings and resources, but with the intellectual activities in which teachers and children will engage.

Note

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